ATTACHMENT F: EMERGENCY AND REMEDIAL RESPONSE PLAN 40 CFR 146.94(a)

CLEAN ENERGY SYSTEMS MENDOTA

1. Facility Information

Facility name:	CLEAN ENERGY SYSTEMS MENDOTA MENDOTA_INJ_1
Facility contact:	Rebecca Hollis 400 Guillen Pkwy, Mendota, CA 93640 Office: 916-638-7967
Well location:	MENDOTA, FRESNO COUNTY CA LAT/LONG COORDINATES (36.75585015/-120.36440423)

This Emergency and Remedial Response Plan (ERRP) describes actions that Clean Energy Systems shall take to address movement of the injection fluid or formation fluid in a manner that may endanger an underground source of drinking water (USDW) during the construction, operation, or post-injection site care periods.

If Clean Energy Systems obtains evidence that the injected CO_2 stream and/or associated pressure front may cause an endangerment to a USDW, Clean Energy Systems must perform the following actions:

1. Initiate shutdown plan for the injection well.
2. Take all steps reasonably necessary to identify and characterize any release.
3. Notify the permitting agency (UIC Program Director) of the emergency event within 24 hours.
4. Implement applicable portions of the approved ERRP.

Where the phrase "initiate shutdown plan" is used, the following protocol will be employed: Clean Energy Systems will immediately cease injection. However, in some circumstances, Clean Energy Systems will, in consultation with the UIC Program Director, determine whether gradual cessation of injection (using the parameters set forth in Attachment A of the Class VI permit) is appropriate.

This attachment is one of the several documents listed below that was prepared by Schlumberger and delivered to Clean Energy Systems. These documents were prepared to support the Clean Energy Systems preconstruction application to the EPA.

- (Schlumberger, Attachment A: Summary of Requirements Class VI Operating, 2020)
- (Schlumberger, Attachment B: Area of Review and Corrective Action Plan, 2020)
- (Schlumberger, Attachment C: Testing and Monitoring Plan, 2020)
- (Schlumberger, Attachment D: Injection Well Plugging Plan, 2020)

- (Schlumberger, Attachment E: Post-Injection Site Care and Site Closure Plan, 2020)
- (Schlumberger, Attachment F: Emergency and Remedial Response Plan, 2020)
- (Schlumberger, Attachment G: Construction Details Clean Energy Systems Mendota, 2020)
- (Schlumberger, Attachment H: Financial Assurance Demonstration, 2020)
- (Schlumberger, Class VI Permit Application Narrative, 2020)
- (Schlumberger Quality Assurance and Surveillance Plan, 2020)

Contents

1.1 Acronyms and Abbreviations

*: Denotes a Mark of Schlumberger

AoR: Area of review

BFS: Base of fresh water

BGS: Below ground surface

CCS: Carbon capture and storage

CEMA: California Emergency Management Agency

CES: Clean Energy Systems

CNE: Carbon negative energy

DFN: Discrete fracture network

DST: Drill stem test

DT: Compressional slowness

DTS: Distributed temperature sensing

EPA: Environmental Protection Agency

FMI: Formation microimager

GRFS: Gaussian random function simulation

GR: Gamma ray

GS: Geological sequestration

KH: Permeability thickness

KINT: Permeability

Mendota_INJ_1: Proposed CO_2 Injection Well

MIT: Mechanical integrity test

MWD: Measurement while drilling

NPHI: Neutron porosity

PISC: Post injection Site Care

PHIT: Total porosity

PIGE: Effective porosity

RHOB: Bulk density

Rwa: Formation water resistivity

SGR: Shale gouge ratio

Shmax: maximum horizontal stress

Shmin: minimum horizontal stress

SP: Spontaneous potential

USDW: Underground sources of drinking water

VCL: Volume clay

VSP: Vertical Seismic profile

Vp/Vs: Compressional to shear velocity ratio

XRD: X-Ray diffraction analysis

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2. Local Resources and Infrastructure

Resources in the vicinity of the Clean Energy Systems Mendota that may be affected as a result of an emergency event at the project site include:

- Underground sources of drinking water, or USDW's and water wells within the AoR. There are approximatly 67 water supply well, monitoring wells and water wells abandoned wells within the AoR (red polygon Figure 1). A map displaying the locations of these wells can be found in the (CLASS VI PERMIT APPLICATION NARRATIVE 40 CFR 146.82(a) Clean Energy Systems Mendota, 2019). The location of these wells is not accurate because they were originally reported in a legal land description format; therefore, they all plot in the middle of a section and line up in an organized grid pattern (California Department of Water Resources, n.d.). In future phases of this project, accurate locations of these water wells will be provided. The deepest USDW is the Santa Margarita formation at depth of approximately 1,400 ft. The San Joaquin River flows north south and is 0.6 miles due east of the site. The northern boundary of the Mendota Wildlife Area is 1.7 miles to the south. Managed by the California Department of Fish and Wildlife. The Mendota Wildlife Area is approximately 11,800 acres consisting of flatlands and floodplain.

Infrastructure in the vicinity of the Clean Energy Systems Mendota that that may be affected as a result of an emergency at the project site include:

- The town of Mendota, CA is west of the site. Mendota is a town in Fresno County. The population was 11,014 at the 2010 U.S. Census. It covers 3.3 square miles and has approximately 2,750 households. The nearest residence to the site is 0.5 miles west and outside the Aor. Mendota is located 8.5 miles south-southeast of Firebaugh, at an elevation of 174 feet. Between the site and the town are several businesses, including Gonzales Transport and airstrip (1,500') west. There is also the King Kool cold storage facility and Oro Loma Ranch/Ruby Fresh, a pomegranate marketing firm. Mendota High School is 0.7 miles south-west. The North Star solar facility borders on the north of the site and is a 61-megawatt facility is located on 626 acres.

Resources and infrastructure addressed in this plan are shown in Figure 1.

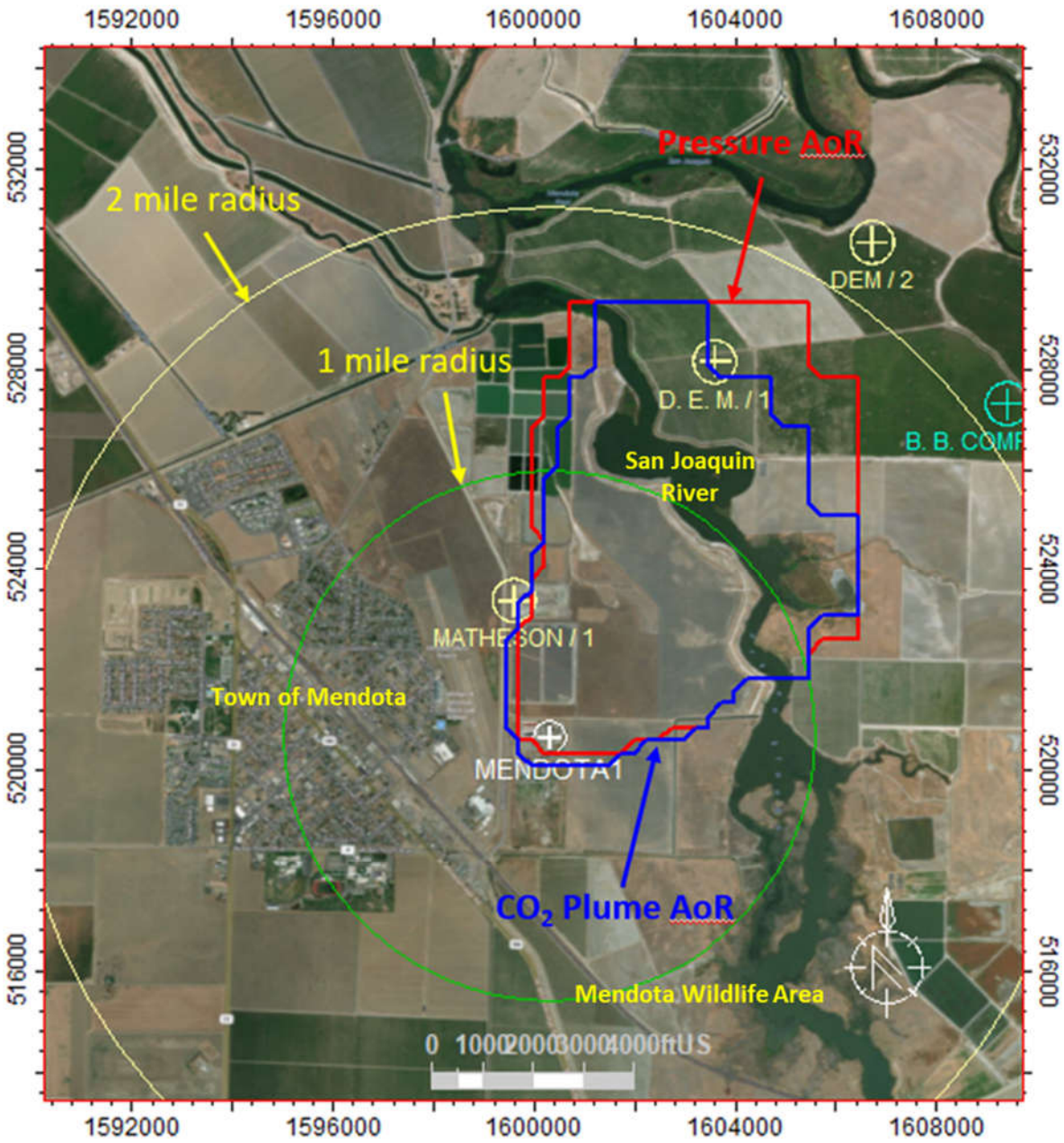

Figure 1. Map of the site resources and infrastructure

3. Potential Risk Scenarios

The following events related to the Clean Energy Systems Mendota that could potentially result in an emergency response:

- Over-pressurized fluid (blowout) during well construction;
- Injection or monitoring (verification) well integrity failure;

- Injection well monitoring equipment failure (e.g., shut-off valve or pressure gauge, etc.);
- A natural disaster (e.g., earthquake, tornado, lightning strike);
- Fluid (e.g. brine) leakage to a USDW;
- CO_2 leakage to USDW or land surface; or
- Induced seismic event.

Response actions will depend on the severity of the event(s) triggering an emergency response. "Emergency events" are categorized as shown in Table 1.

Table 1. Degrees of risk for emergency events.

Emergency Condition	Definition
Major emergency	Event poses immediate substantial risk to human health, resources, or infrastructure. Emergency actions involving local authorities (evacuation or isolation of areas) should be initiated.
Serious emergency	Event poses potential serious (or significant) near term risk to human health, resources, or infrastructure if conditions worsen or no response actions taken.
Minor emergency	Event poses no immediate risk to human health, resources, or infrastructure.

4. Emergency Identification and Response Actions

Steps to identify and characterize the event will be dependent on the specific issue identified, and the severity of the event. The potential risk scenarios identified in Part 2 are detailed below.

4.1 Over-pressurized fluid (blowout) during well construction

This event could occur during well drilling, if a pocket of high-pressure gas or fluid is encountered resulting in a sudden release:

- Cease drilling operations:
  - Loss of drilling fluid due to lost circulation.
  - Drilling into an over-pressured formation.

Response actions:

- Inject heavy fluid to regain hydrostatic control.
- Close flow valve (blowout preventer)
- For a Major or Serious emergency:
    - Initiate well control procedures (see well plan).
    - Alert local fire and police and UIC Program Director immediately.
- For a Minor emergency:
    - Inject heavy fluid to regain hydrostatic control.
    - Determine cause of event and initiate remediation procedures.
    - Notify the UIC Program Director within 24 hours of the emergency event, per 40 CFR 146.91(c).

4.2 Well Integrity Failure

Integrity loss of the injection well and/or verification well may endanger USDWs. Integrity loss may have occurred if the following events occur:

- Automatic shutdown devices are activated:
    - Wellhead pressure exceeds the specified shutdown pressure specified in the permit.
    - Annulus pressure indicates a loss of external or internal well containment.
    - Pursuant to 40 CFR 146.91(c)(3), Clean Energy Systems must notify the UIC Program Director within 24 hours of any triggering of a shut-off system (i.e., down-hole or at the service).
- Mechanical integrity test results identify a loss of mechanical integrity.

Response actions:

- Notify the UIC Program Director within 24 hours of the emergency event, per 40 CFR 146.91(c).
- Determine the severity of the event, based on the information available, within 24 hours of notification.
- For a Major or Serious emergency:
    - Initiate immediate shutdown plan.
    - Shut in well (close flow valve).
    - Vent CO2 from surface facilities.
    - Communicate with CES personnel and local authorities to initiate evacuation plans, as necessary.

  - Monitor well pressure, temperature, and annulus pressure to verify integrity loss and determine the cause and extent of failure; identify and implement appropriate remedial actions to repair damage to the well (in consultation with the UIC Program Director).
  - If contamination is detected, identify and implement appropriate remedial actions (in consultation with the UIC Program Director).

- For a Minor emergency:
  - Conduct assessment to determine whether there has been a loss of mechanical integrity.
  - If there has been a loss of mechanical integrity, initiate shutdown plan.
  - Shut in well (close flow valve).
  - Vent CO2 from surface facilities.
  - Reset automatic shutdown devices.
  - Monitor well pressure, temperature, and annulus pressure to verify integrity loss and determine the cause and extent of failure; identify and implement appropriate remedial actions to repair damage to the well (in consultation with the UIC Program Director).

4.3 Injection Well Monitoring Equipment Failure

The failure of monitoring equipment for wellhead pressure, temperature, and/or annulus pressure may indicate a problem with the injection well that could endanger USDWs.

Response actions:

- Notify the UIC Program Director within 24 hours of the emergency event, per 40 CFR 146.91(c).
- Determine the severity of the event, based on the information available, within 24 hours of notification.
- For a Major or Serious emergency:
  - Initiate immediate shutdown plan.
  - Shut in well (close flow valve).
  - Vent CO2 from surface facilities.
  - Communicate with CES personnel and local authorities to initiate evacuation plans, as necessary.
  - Monitor well pressure, temperature, and annulus pressure to verify integrity loss and determine the cause and extent of failure; identify and implement appropriate remedial actions to repair damage to the well (in consultation with the UIC Program Director).

  - If contamination is detected, identify and implement appropriate remedial actions (in consultation with the UIC Program Director).

- For a Minor emergency:
  - Conduct assessment to determine whether there has been a loss of mechanical integrity.
  - If there has been a loss of mechanical integrity, initiate shutdown plan.
  - Shut in well (close flow valve).
  - Vent CO2 from surface facilities.
  - Reset automatic shutdown devices.
  - Monitor well pressure, temperature, and annulus pressure to verify integrity loss and determine the cause and extent of failure; identify and implement appropriate remedial actions to repair damage to the well (in consultation with the UIC Program Director).

4.4 Potential Brine or CO_2 Leakage to USDW

Elevated concentrations of indicator parameter(s) in groundwater sample(s) or other evidence of fluid (brine) or CO_2 leakage into a USDW.

Response actions:

- Notify the UIC Program Director within 24 hours of the emergency event, per 40 CFR 146.91(c).
- Determine the severity of the event, based on the information available, within 24 hours of notification.
- For all emergencies (Major, Serious, or Minor):
  - Initiate shutdown plan.
  - Insert appropriate additional steps.
  - If the presence of indicator parameters is confirmed, develop (in consultation with the UIC Program Director) a case-specific work plan to:
    - Install additional groundwater monitoring points near the affected groundwater well(s) to delineate the extent of impact; and
    - Remediate unacceptable impacts to the affected USDW.
  - Arrange for an alternate potable water supply, if the USDW was being utilized and has been caused to exceed drinking water standards.
  - Proceed with efforts to remediate USDW to mitigate any unsafe conditions (e.g., install system to intercept/extract brine or CO2or “pump and treat” to aerate CO2-laden water).

- Continue groundwater remediation and monitoring on a frequent basis (frequency to be determined by Clean Energy Systems and the UIC Program Director) until unacceptable adverse USDW impact has been fully addressed.

4.5 Natural Disaster

Well problems (integrity loss, leakage, or malfunction) may arise as a result of a natural disaster affecting the normal operation of the injection well. An earthquake may disturb surface and/or subsurface facilities; and weather-related disasters (e.g., tornado or lightning strike) may affect surface facilities.

If a natural disaster occurs that affects normal operation of the injection well, perform the following:

Response actions:

- Notify the UIC Program Director within 24 hours of the emergency event, per 40 CFR 146.91(c).
- Determine the severity of the event, based on the information available, within 24 hours of notification.
- For a Major or Serious emergency:
  - Initiate immediate shutdown plan. Shut in well (close flow valve).
  - Vent CO2 from surface facilities.
  - Communicate with CES personnel and local authorities to initiate evacuation plans, as necessary.
  - Monitor well pressure, temperature, and annulus pressure to verify integrity loss and determine the cause and extent of failure; identify and implement appropriate remedial actions to repair damage to the well (in consultation with the UIC Program Director).
  - Determine if any leaks to ground water or surface water occurred.
  - If contamination is detected, identify and implement appropriate remedial actions (in consultation with the UIC Program Director).
- For a Minor emergency:
  - Conduct assessment to determine whether there has been a loss of mechanical integrity.
  - If there has been a loss of mechanical integrity, initiate shutdown plan.
  - Shut in well (close flow valve).

- Vent CO2 from surface facilities

- Monitor well pressure, temperature, and annulus pressure to verify integrity loss and determine the cause and extent of failure; identify and implement appropriate remedial actions to repair damage to the well (in consultation with the UIC Program Director).

4.6 Induced Seismic Event

Based on the project operating conditions, it is highly unlikely that injection operations would ever induce a seismic event at all. Simulations show extremely small pressure increase produced by the planned injection into the Second Panoche formation. Therefore, this portion of the response plan is developed for any seismic event with an epicenter within a 0.5-mile radius of the injection well.

To monitor the area for seismicity, an optical cable will be installed in the Above Confining Zone monitor well (Mendota_ACZ_1) with Digital Acoustic (DAS). The DAS fiber cable with monitor continuously and recorded by a surface recording system. The recording system will be programed to identify induced seismic events in real time and is programed to automatically send alerts to site safety personnel.

Based on the periodic analysis of the monitoring data, observed level of seismic activity, and local reporting of felt events, the site will be assigned an operating state. The operating state is determined using threshold criteria which correspond to the site's potential risk and level of seismic activity. The operating state provides operating personnel information about the potential risk of further seismic activity and guides them through a series of response actions.

The seismic monitoring system structure is presented in *Table **2***. The table corresponds each level of operating state with the threshold conditions and operational response actions.

Table 2. Seismic monitoring system, for seismic events > M1.0 with an epicenter within a 0.5-mile radius of the injection well.

Operating State	Threshold Condition[1,2]	Response Action[3]
Green	Seismic events less than or equal to M1.5	1. Continue normal operation within permitted levels.
Yellow	Five (5) or more seismic events within a 30-day period having a magnitude greater than M1.5 but less than or equal to M2.0	1. Continue normal operation within permitted levels. 2. Within 24 hours of the incident, notify the UIC Program Director of the operating status of the well.
Orange	Seismic event greater than M1.5 and local observation or felt report Seismic event greater than M2.0 and no felt report	1. Continue normal operation within permitted levels. 2. Within 24 hours of the incident, notify the UIC Program Director, of the operating status of the well. 3. Review seismic and operational data. 4. Report findings to the UIC Program Director and issue corrective actions.
Magenta	Seismic event greater than M2.0 and local observation or report	1. Initiate rate reduction plan. 2. Within 24 hours of the incident, notify the UIC Program Director, of the operating status of the well. 3. Communicate with facility personnel and local authorities to initiate evacuation plans, as necessary. 4. Monitor well pressure, temperature, and annulus pressure to verify well status and determine the cause and extent of any failure; identify and implement appropriate remedial actions (in consultation with the UIC Program Director). 5. Determine if leaks to ground water or surface water occurred. 6. If USDW contamination is detected: a. Notify the UIC Program Director within 24 hours of the determination. 7. Review seismic and operational data. 8. Report findings to the UIC Program Director and issue corrective actions.

[1] Specified magnitudes refer to magnitudes determined by local Clean Energy Systems or USGS seismic monitoring stations or reported by the USGS National Earthquake Information Center using the national seismic network.

[2] "Felt report" and "local observation and report" refer to events confirmed by local reports of felt ground motion or reported on the USGS "Did You Feel It?" reporting system.

[3] Reporting findings to the UIC Program Director and issuing corrective action will occur within 25 business days (five weeks) of change in operating state.

Operating State	Threshold Condition[1,2]	Response Action[3]
Red	Seismic event greater than M2.0, and local observation or report, and local report and confirmation of damage[4] Seismic event >M3.5	1. Initiate shutdown plan. 2. Within 24 hours of the incident, notify the UIC Program Director of the operating status of the well. 3. Communicate with facility personnel and local authorities to initiate evacuation plans, as necessary. 4. Monitor well pressure, temperature, and annulus pressure to verify well status and determine the cause and extent of any failure; identify and implement appropriate remedial actions (in consultation with the UIC Program Director). 5. Determine if leaks to ground water or surface water occurred. 6. If USDW contamination is detected: a. Notify the UIC Program Director within 24 hours of the determination. 7. Review seismic and operational data. 8. Report findings to the UIC Program Director and issue corrective actions.

[4] Onset of damage is defined as cosmetic damage to structures, such as bricks dislodged from chimneys and parapet walls, broken windows, and fallen objects from walls, shelves, and cabinets.

5. Response Personnel and Equipment

Site personnel, project personnel, and local authorities will be relied upon to implement this ERRP.

Site personnel to be notified (not listed in order of notification):

1. Emergency Coordinator - Control Room technician on Duty: 559-655-4923
2. Plant Safety Manager - Clint Cooper: Off: (559) 655-3947, 24 hr: 559-916-2139
3. Alt Facility Emergency Coord.: Arnold Gonzales: Office: (559) 655-4921 x12 Mobile: (559) 916-2142
4. Plant Manager

A site-specific emergency contact list will be developed and maintained during the life of the project. Clean Energy Systems will provide the current site-specific emergency contact list to the UIC Program Director.

Table 3. Contact information for key local, state, and other authorities.

Agency	**Phone Number**
Local police	911
Mendota Fire Department	911
Ambulance/Paramedics	911
Fresno Community Regional Medical Center	24 hr 559-459-6000
Poison Control Center	800-342-9293
California Office of Emergency Services	24 hr 800-852-7550
State Water Quality Control Board (Central Valley)	916-255-3000
Environmental services contractor - Schlumberger	661-864-4700
UIC Program Director	Not yet assigned
EPA National Response Center (24 hours)	800-424-8802
State geological survey	916-322-1080

Equipment needed in the event of an emergency and remedial response will vary, depending on the triggering emergency event. Response actions (cessation of injection, well shut-in, and evacuation) will generally not require specialized equipment to implement. Where specialized equipment (such as a drilling rig or logging equipment) is required, Clean Energy Systems shall be responsible for its procurement.

6. Emergency Communications Plan

Clean Energy Systems will communicate to the public about any event that requires an emergency response to ensure that the public understands what happened and whether there are any environmental or safety implications. The amount of information, timing, and communications method(s) will be appropriate to the event, its severity, whether any impacts to drinking water or other environmental resources occurred, any impacts to the surrounding community, and their awareness of the event.

Clean Energy Systems will describe what happened, any impacts to the environment or other local resources, how the event was investigated, what responses were taken, and the status of the response. For responses that occur over the long-term (e.g., ongoing cleanups), Clean Energy Systems will provide periodic updates on the progress of the response action(s).

Clean Energy Systems will also communicate with entities who may need to be informed about or take action in response to the event, including local water systems, CO2 source(s) and pipeline operators, land owners, and Regional Response Teams (as part of the National Response Team).

7. Plan Review

This ERRP shall be reviewed:

- At least once every five (5) years following its approval by the permitting agency;
- Within one (1) year of an area of review (AOR) reevaluation;
- Within 30 days, or other time prescribed by the EPA Director, following any significant changes to the injection process or the injection facility, or an emergency event; or
- As required by the permitting agency.

If the review indicates that no amendments to the ERRP are necessary, Clean Energy Systems will provide the permitting agency with the documentation supporting the "no amendment necessary" determination.

If the review indicates that amendments to the ERRP are necessary, amendments shall be made and submitted to the permitting agency within 30 days, or other time prescribed by the EPA Director, following an event that initiates the ERRP review procedure.

8. Staff Training and Exercise Procedures

CES will integrate the ERRP into the storage site specific standard operating procedures and training program.

- Periodic training will be provided, not less than annually

- Training will be provided to well operators, plant safety and environmental personnel, the plant manager, plant superintendent, and corporate communications. The training plan will document that the above listed personnel have been trained and possess the required skills to perform their relevant emergency response activities described in the ERRP.

9. References

California Department of Water Resources. (n.d.). Retrieved from water.ca.gov/Library/Other-DWR-Portals

(2019). *CLASS VI PERMIT APPLICATION NARRATIVE 40 CFR 146.82(a) Clean Energy Systems Mendota.* CES.

Schlumberger Quality Assurance and Surveillance Plan. (2020). *Quality Assurance and Surveillance Plan.*

Schlumberger, Attachment A: Summary of Requirements Class VI Operating. (2020). *Attachment A: Summary of Requirements Class VI Operating and Reporting Conditions.*

Schlumberger, Attachment B: Area of Review and Corrective Action Plan. (2020). *Attachment B: Area of Review and Corrective Action Plan 40 CFR 146.84(b) Clean Energy Systems Mendota.*

Schlumberger, Attachment C: Testing and Monitoring Plan. (2020). *Attachment C: Testing and Monitoring Plan 40 CFR 146.90 Clean Energy Systems Mendota.*

Schlumberger, Attachment D: Injection Well Plugging Plan. (2020). *Attachment D: Injection Well Plugging Plan 40 CFR 146.92(B) Clean Energy Systems Mendota.*

Schlumberger, Attachment E: Post-Injection Site Care and Site Closure Plan. (2020). *Attachment E: Post-Injection Site Care and Site Closure Plan 40 CFR 146.93(A) Clean Energy Systems Mendota.*

Schlumberger, Attachment F: Emergency and Remedial Response Plan. (2020). *Attachment F: Emergency and Remedial Response Plan 40 CFR 146.94(A) Clean energy Systems Mendota.*

Schlumberger, Attachment G: Construction Details Clean Energy Systems Mendota. (2020). *Attachment G: Construction Details Clean Energy Systems Mendota.*

Schlumberger, Attachment H: Financial Assurance Demonstration. (2020). *Attachment H: Financial Assurance Demonstration 40 CFR 146.85 Clean Energy Systems Mendota.*

Schlumberger, Class VI Permit Application Narrative. (2020). *Class VI Permit Application Narrative 40 CFR 146.82(A) Clean Energy Systems Mendota.*